Research News 2014

Research Division at Sveriges Riksbank

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This newsletter describes the research activities and output of the Research Division at Sveriges Riksbank in 2014.

Staff at the Research Division, 2014

Gustav Alfelt, research assistant

Christoph Bertsch, research economist

Roberto Billi, research economist

Paola Boel, research economist

Marieke Bos, visiting research economist

Tobias Broer, visiting scholar

Mikael Carlsson, visiting scholar

Ferre De Graeve, research economist

Tore Ellingsen, visiting scholar

Daria Finocchiaro, research economist

Isaiah Hull, research economist

Tor Jacobson, research economist

Thomas Jansson, research economist

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Vicke Norén, research assistant

Conny Olovsson, research economist

Matias Quiroz, Ph.D. student at Stockholm University

Peter van Santen, research economist

Mattias Villani, visiting scholar

Leo Voltaire, research assistant

Erik von Schedvin, research economist

Karl Walentin, research economist

Andreas Westermark, research economist

Xin Zhang, research economist

Reflections by the head of research

I still remember my emotions when Anders Vredin called in February 1999 and offered me a job as researcher in the Research Department at Sveriges Riksbank. I was thrilled, of course, but my euphoria over the offer was muted by the realization that with the job came a lot of pressure and responsibilities. Most importantly – would I be able to write novel papers of sufficient quality that could be published in respected international academic journals? To do so was one of the key objectives of researchers at the Riksbank.

I had the same feelings last February, when I was offered the position of head of research at the Riksbank: Great job, but how would I be able to manage the-by-now rather big group of economists (15) and take responsibility for the division achieving its objectives in terms of publications and policy support? These feelings were troubling me last spring and summer, when I worked my last months at the Federal Reserve Board in Washington D.C.

I felt much more relaxed after arriving at the Riksbank in mid-August and attending an internal workshop where the research economists presented their work. In my opinion, many impressive projects were presented there, of which most should stand a very good chance of being published in high-quality journals. Importantly, I also felt that many of the papers dealt with issues that are highly relevant for policy. And making tangible contributions to policy is a key objective for a research department within a policy-making institution like the Riksbank.

I hope that you, Dear Reader, will be able to take some time and look through our Research News. In case you do, I am sure you will share my assessment and be impressed by the depth and breadth of all the fascinating and important work that is conducted within the division. This year, our featured article is Karl Walentin's forthcoming *Journal of Monetary Economics* article on the quantitative business-cycle effects of time variation in the residential mortgage interest rate spread. But the research conducted in the division covers a wide range of topics, such as the optimal rate of inflation, the effects of fossil fuel on economic growth and the consequences of variations in negative consumer credit information.

Before I let you dive into the newsletter, I would like to take the opportunity to thank my predecessor as head of research – Tor Jacobson. Tor was head of the division for 12 years, and has done a tremendous job in developing it into the collegial and productive group it is today. With his passion for research and ability to inspire others, Tor has over the years been a fantastic mentor for me and many other young researchers at the Riksbank, and we all remain heavily indebted to him. We are thus very grateful and happy that he has decided to continue his journey with us in the division, now in his new role as senior research adviser. The position involves a significantly lower administrative load, and thus more time for Tor to delve into the world of microdata on firms and households that he loves.

With this, I am over and out. All that remains for me is to wish You a good read of our news, happy holidays and a productive and successful 2015!

    Jesper Lindé

Changes in the research staff

Several changes occurred within the research staff in 2014. **Jesper Lindé** joined our division as head of research, after having worked in the International Finance Division at the Federal Reserve Board, where he was chief of the Trade and Financial Studies section since 2008. Prior to that, Jesper worked at Sveriges Riksbank between 1999 and 2008, as a researcher in the Research Department until 2006, and as head of the Modelling Unit at the Monetary Policy Department from 2006. His main research interests are in monetary macroeconomics and credit-risk modelling. Jesper is also a CEPR research fellow and an associate professor (without tenure) at the Stockholm School of Economics. He has published papers in leading academic journals like the *American Economic Review*, the *Journal of Monetary Economics*, the *Journal of Economic Dynamics and Control*, and the *Journal of Banking and Finance*. Jesper has also taught courses in monetary economics in the Ph.D. student program in Stockholm, and has been a faculty opponent on Ph.D. dissertations at various universities. **Marieke Bos** was a visiting researcher in our division throughout 2014. Marieke is a post-doctoral fellow who divides her time between the Swedish House of Finance (SHOF) at the Stockholm School of Economics and the Swedish Institute for Social Research (SOFI) at Stockholm University. She also holds a visiting scholar position at the Federal Reserve Bank of Philadelphia. Her research interests include household and behavioral finance, alternative credit markets and banking. **Gustav Alfelt** left the Research Division and joined the Applied and Modeling Division in the Financial Stability Department, where he is involved in statistical analysis and development of the data infrastructure underlying the financial stability analysis.

Summary of featured article

The following is a summary of the article by Karl Walentin titled "Business Cycle Implications of Mortgage Spreads," which was published in the Journal of Monetary Economics, Vol. 67, pp. 62-77.

What are the quantitative business cycle effects of time variation in the residential mortgage interest rate spread? Surprisingly, this question is almost unexplored in the existing literature despite the substantial cyclical variation of this spread in the data. While several recent papers have referenced the issue, none have empirically documented the relationship between mortgage spreads and aggregate quantities. We define the mortgage spread as the difference between the average interest rate on newly issued prime mortgages at a given maturity and the government bond rate of the corresponding maturity. By using this definition, we separate the mortgage spread from the term premium.

Why might mortgage rates affect the macroeconomy? Theoretically, the mortgage rate, and thus the mortgage spread, potentially affects aggregate economic variables through several channels: i) house prices and residential investment through the user cost of housing, ii) as one relevant rate in the consumption/savings decision and, iii) the post-interest disposable income of any household with a mortgage. If house prices are affected by mortgage spreads, then housing wealth and collateral values are also affected. In the presence of collateral constraints mortgage spreads will influence spending decisions through this collateral channel.

The motivation for exploring the business cycle effects of innovations to the residential mortgage spread is threefold. First, this paper seeks to contribute to the general understanding of what drives business cycles. Second, if the mortgage spread affects aggregate variables, then monetary policy should take that into account. Accordingly, the paper documents how monetary policy historically has responded to mortgage spread innovations. Third, this paper has bearings on unconventional monetary policy intended to affect the business cycle through the mortgage spread, such as the Federal Reserve's recent purchases of mortgage backed securities (MBS).

The US is the primary country of study over the sample period 1983q1-2011q4. We start by documenting the substantial time variation in the mortgage spread and that the spread is countercyclical. Furthermore, the maximum absolute cross-correlation occurs when the mortgage spread leads GDP by 2-3 quarters. In other words, the spread is lowest immediately prior to GDP peaks and highest immediately prior to GDP troughs. Our main exercise is inspired by Gilchrist and Zakrajšek's (2012) work on the macroeconomic effects of corporate bond spreads. The role of innovations to mortgage spreads for business cycles is documented by estimating a structural vector autoregression (SVAR). The baseline SVAR includes the following seven variables in levels: consumption, residential investment, GDP, the consumer price index, the mortgage spread, the policy interest rate, and house prices. The identifying restriction is that mortgage spread shocks do not affect aggregate quantities or consumer prices on impact but are allowed to contemporaneously affect the policy rate and house prices.

The mortgage spread impulse responses obtained are consistent with the simple theoretical relationships mentioned above and indicate that mortgage spread shocks have sizeable effects on the macroeconomy. They are also consistent with an interpretation of mortgage spread shocks as credit supply shocks: aggregate quantities and house prices all decrease following a positive innovation to the spread. A mortgage shock of 100 basis points (bps) yields a decrease of 1.6 percent in consumption, 6.2 percent in residential investment, and 1.9 percent in GDP. These responses are gradual and reach a trough after more than one year. House prices respond faster and decline by 2.6 percent. A 100 bps mortgage spread shock yields a fast and strong 184 bps offsetting response of the policy rate. From the point of view of unconventional monetary policy these results provide a lower bound. The reason is that in a setting where the policy rate is fixed and cannot accommodate the mortgage shock, such as during the recent zero-lower bound period in the US, the responses of all other variables will be stronger. The importance of mortgage spread shocks is moderate in terms of variance decomposition at business cycle frequencies. Roughly 10 percent of consumption, GDP and house price variation is due to the spread shock at short horizons. In this respect, mortgage spread shocks are as important for the business cycle as the excess (corporate) bond premium shock documented in Gilchrist and Zakrajšek (2012).

We find similar results for the UK and Sweden. Mortgage spread innovations also appear both statistically and economically important for these countries. Furthermore, they induce the same qualitative dynamics. However, the mortgage spread shock is more important for aggregate quantities and house prices in these countries compared to the US and its impact is faster. This difference may be due to the much shorter duration of the typical mortgage contract in the UK and Sweden compared to the US. Our results are robust to several variations in both the SVAR specification and the sample period. Perhaps most importantly, the importance of mortgage spread innovations is not diminished when a corporate bond spread is controlled for in the VAR. We use an alternative measure of the mortgage spread that accounts for the prepayment option in US mortgages. We change the basic identification approach by using sign restrictions. For a given size of the mortgage spread shock, effects on aggregate quantities are larger for both of these alternative specifications. To our knowledge, this paper is unique in that it empirically quantifies the business cycle effects of mortgage spread innovations without relying on a specific theoretical model.

The main takeaways from this paper are the following: i) business cycle fluctuations are affected by financial frictions and shocks in the residential mortgage market, and ii) if unconventional monetary policy in the form of asset purchases succeeds in affecting the mortgage spread, then it has sizable effects on aggregate quantities and house prices. Similarly, macroprudential policies that affect the mortgage spread have sizable business cycle effects.

Research projects pursued in 2014

BARGAINING THEORY

Long-Term Relationship Bargaining
Andreas Westermark

We analyze a bargaining model where there is a long-term relationship between a seller and a buyer and there is bargaining over a sequence of surpluses that arrives at fixed points in time. Markov Perfect Equilibria are analyzed and equilibrium payoffs characterized. The transfers between the players can be described as a first-order system of difference equations. Payoffs depend on both current and future surpluses. Future surpluses are important partly because the risk of separation leads to the loss of surplus today and in the future and partly because delay without separation can last into future periods. We also find conditions for existence and uniqueness of equilibria with immediate agreement.

(continuing from previous year)

COMPUTATIONAL ECONOMICS

Approximate Dynamic Programming with Post-Decision States as a Solution Method for Dynamic Economic Models
Isaiah Hull

I introduce and evaluate a new stochastic simulation method for dynamic economic models. It is based on recent work in the operations research and engineering literatures (Van Roy et. al, 1997; Powell, 2007; Bertsekas, 2011), but also had an early application in economics (Wright and Williams, 1982, 1984). The baseline method involves rewriting the household's dynamic program in terms of post-decision states. This makes it possible to choose controls optimally without computing an expectation. I add a subroutine to the original algorithm that updates the values of states not visited frequently on the simulation path; and adopt

a stochastic stepsize that efficiently weights information. Finally, I modify the algorithm to exploit GPU computing.

(continuing from previous year)

CREDIT AND BANKING

Trade Credit and the Propagation of Corporate Failure: an Empirical Analysis
Tor Jacobson and Erik von Schedvin

Using an exhaustive data set on claims held by trade creditors (suppliers) on failed trade debtors (customers), we quantify the importance of trade credit chains for the propagation of corporate bankruptcy. We show that trade creditors experience significant trade credit losses due to trade debtor failures and that the creditors' bankruptcy risks increase in the size of incurred losses. By exploring the role of financial constraints and creditor-debtor dependence, we conclude that the propagation mechanism is driven by both credit losses and demand shrinkage. Furthermore, propagation is mitigated for less-leveraged, cash rich, and profitable creditors. It is instead enhanced during economic downturns.

(continuing from previous year)

On the Non-Exclusivity of Loan Contracts: An Empirical Investigation
Hans Degryse, Vasso Ioannidou and Erik von Schedvin

A string of theoretical papers shows that the non-exclusivity of credit contracts generates important negative contractual externalities. Employing a unique dataset, we identify how these externalities affect the supply of credit. Using internal information on a creditor's willingness to lend, we find that a creditor reduces its credit supply when a borrower obtains a loan at another creditor (an "outside loan"). Consistent with the theoretical literature, the effect is more pronounced the larger the outside loans. It is instead muted if the initial creditor's existing and future loans retain seniority over the outside loans and are secured with valuable collateral.

(continuing from previous year)

Trade Credit Networks and Corporate Cash Holdings
Niklas Amberg, Tor Jacobson, Robert Townsend and Erik von Schedvin

We evaluate whether the degree of inter-firm connectedness through trade credit usage impact on corporate cash holdings. Our empirical analysis documents three interesting findings. First, corporate cash holdings exhibit a negative relationship with accounts payable. Second, by exploring a temporary change in the Swedish bankruptcy law, we establish a causal effect from accounts payable on cash holdings. Last, we find that the effect of accounts payable on cash holdings is mitigated if the suppliers of the firms are more liquidity constrained. These results are in line with the presumption that informal trade credit networks work as a risk sharing device.

(continuing from previous year)

A Micro-Based Macro-Prudential Indicator: Future Firm-Failure Frequencies
Tor Jacobson, Ingvar Strid and Erik von Schedvin

The purpose of this project is to explore stress testing of the Swedish corporate sector with respect to firm failure risks as a tool for enhanced macroprudential policy analysis. It can be shown that the aggregate firm failure frequency in Sweden is highly correlated with the Swedish bank's credit losses over time (for the period 1990-2009). Hence, by means of reasonably accurate forecasts of future failure frequencies one could hope to make inference about future credit losses. Moreover, if such forecasts are model based, then the model can serve as a basis for stress testing the corporate sector's vulnerability in various scenarios. We propose to estimate a logistic model of firm failure similar to Jacobson, Lindé, and Roszbach (2011) and evaluate the model's forecasting properties for horizons up to 3 years. Firm-failure frequency forecasts will be calculated by conditioning on the macroeconomic scenarios generated by the Riksbank DSGE model "Ramses".

(continuing from previous year)

Effect of Corporate Liquidity on Swedish Exports during the 2008-2009 Financial Crisis
Laurent Bach, Tor Jacobson and Erik von Schedvin

We have been able to purchase firm-level export data from SCB and match it with data from UC on corporate defaults and balance sheet information. This has allowed us to check that Swedish exporting

firms have been particularly hit during the period going from October 2008 to June 2009. Interestingly, the degree of export reduction during that period is closely rated to the amount of cash holdings held by firms prior to the crisis. We make the hypothesis that this is because keeping a long-term export activity requires a large amount of working capital, but outside funding for working capital was unavailable during the crisis. What further confirms this hypothesis is that cash holdings were particularly useful around 2008-2009 in preserving export relationships with faraway destinations, for which working capital requirements are the biggest. Since we were given access to client data from the Swedish loan guarantee agency, we are now investigating whether export loan guarantees provided by the government were able to substitute for cash holdings and help cash-poor firms sustain their export activity during the financial crisis.

(continuing from previous year)

What Do 53 Million Trade Credit Contracts Say About Inter-Firm Liquidity Provision?
Tore Ellingsen, Tor Jacobson and Erik von Schedvin

What determines the conditions in trade credit contracts and their ex post realizations? In this paper, we make use of a large data set containing contract-level information on trade credit issued by 51 Swedish corporate trade creditors (suppliers) over the period 2004–2012. Using the identities of the trade creditors as well as their corporate debtors (customers), we can condition our empirical analysis on creditor and debtor characteristics, and even on creditor-debtor (match) specific characteristics.

The Importance of Reallocation for Productivity Growth: Evidence from European and U.S. Banking
Jaap Bos, Paul Schilp and Peter van Santen

This paper quantifies the effect of reallocation dynamics on aggregate productivity developments in the banking sectors of Europe and the United States. We document an increase in productivity over the period 1995-2009, on the order of 11% in the US and 19% in Europe. At an annual frequency, under-performing banks capture market share, while more productive banks lose market share, in particular in the US. The pattern of reallocation is markedly different between the geographical regions: European productivity has grown by reallocating inputs through the first half of the sample, at the same time when reallocation diminished growth in the US. Within-firm growth has been rising steadily in both areas, largely due to technical change. The long-run positive effects of creative destruction are especially apparent in the US, where reallocation is an important driver of increases in aggregate productivity.

(continuing from previous year)

Systematic Bailout Guarantees and Tacit Coordination
Christoph Bertsch, Claudio Calcagno and Mark Le Quement

Both the academic literature and the policy debate on systematic bailout guarantees and Government subsidies have ignored an important effect: in industries where firms may go out of business due to idiosyncratic shocks, Governments may increase the likelihood of (tacit) coordination if they set up schemes that rescue failing firms. In a repeated-game setting, we show that a systematic bailout regime increases the expected profits from coordination and simultaneously raises the probability that competitors will remain in business and will thus be able to 'punish' firms that deviate from coordinated behavior. These effects make tacit coordination easier to sustain and have a detrimental impact on welfare. While the key insight holds across any industry, we study this question with an application to the banking sector, in light of the recent financial crisis and the extensive use of bailout schemes.

(accepted for publication)

Self-Control and Credit, Evidence from a Nationwide Experiment in the Supply of Alcohol
Marieke Bos

Restrictions on alcohol sales hours or days are commonly used tools in order to reduce alcohol consumption. However, a forward-looking consumer can buy in advance, and thereby mostly undo the impact of the restriction. I study whether a nationwide experiment in the increase of supply of alcohol in Sweden has impacted the likelihood of consumers to take a high interest short term loan. I find that the increase in opening hours of the national monopolist in alcohol increased both the likelihood to take a short term loan and increase the size of the loan. Moreover the likelihood to repay an already outstanding loan was diminished. This effect is mostly driven by Swedish born while immigrants are typically over represented in this alternative credit market.

Should Defaults Be Forgotten? Evidence from Variation in Removal of Negative Consumer Credit Information
Marieke Bos and Leonard Nakamura

Practically all industrialized economies restrict the length of time that credit bureaus can retain borrowers' past defaults in their files. In the aftermath of the financial crisis, the practice of penalizing consumers' credit scores long after they have paid off their debts has sparked a new debate on the length of such retention times. By exploiting a quasi-experimental variation in this retention time, we investigate what happens when retention times are reduced. We find that the loss of information led banks to tighten their lending standards significantly. However this effect was partly offset by the positive shift in creditworthiness due to earlier deletion of past defaults and borrowers' incentive to exert more effort in order to keep her good reputation. Nevertheless, we do find that the reduced punishment led borrowers who experience this shorter retention time default more frequently. Since borrowers nonetheless obtain more net access to credit and total defaults do not increase overall, we cannot rule out that this reduction in retention time is optimal.

Bad Times, Good Credit
Bo Becker, Marieke Bos and Kasper Roszbach

Is assessing borrower quality harder or easier in recessions? We test this empirically through 1½ - 2 business cycles using a loan and borrower data set from a large bank in Sweden. We find that the bank ability to detect differences in default risk is best in worst times. Using measures of *credit assessment* holding *credit amount* fixed. This is especially true for borrower assessments that have recently been made by the loan officer. Our findings suggest that the cyclicality of bank credit does not fundamentally reflect information frictions between borrower and lender, but that other factors must drive cycles like agency problems or frictions related to bank financing.

Lender Bidding and Smart Disclosure in Consumer Credit Markets
Sumit Agarwal, Marieke Bos and Kasper Roszbach

In this paper we try to answer the following two questions: Can increased competition through online bidding by the banks lead to lower prices for uncollateralized consumer credit? And, does smart disclosure help consumers pick the right bid? The answer is yes to both these questions. Using data from a Swedish internet-based marketplace for consumer credit we observe the demand for credit from the household. Next, we observe the bidding behavior of multiple banks in terms of – price, quantity and duration. We find that subsequent bids offer lower price controlling for quantity. By facilitating easy comparison of the bids, by the intermediary, we find that consumers are able to minimize the cost of credit from the choice set.

Old Habits Die Hard, Evidence from a Natural Experiment in the Timing of Mainstream Credit Access
Marieke Bos, Ronel Elul and Leonard Nakamura

Access to savings and affordable credit are seen as fundamental components of consumer empowerment, self-sufficiency, and poverty alleviation strategies. We exploit the quasi-experimental variation in access to mainstream credit to study how alternative credit borrowers respond to mainstream credit access. We find that alternative credit borrowers barely adjust their more expensive borrowing habits when they receive access to mainstream (cheaper) credit in the short and medium run. However we do find evidence that borrowers utilize their alternative credit uptake to avoid additional arrears that would prolong exclusion from mainstream credit. Our results suggest that either the borrowing constraints were not loosened enough by the mainstream credit access or the advantages of alternative credit (i.e. credit unobserved by credit bureaus and thus no risk to influence credit scores) outweighs the additional cost of alternative credit. Nevertheless our findings support the notion that expensive consumer loans help borrowers better manage liquidity to alleviate financial distress.

ECONOMETRICS

Dynamic Mixtures-of-Experts Models for Longitudinal and Discrete-Time Survival Data
Matias Quiroz and Mattias Villani

We propose a general class of flexible models for longitudinal data with special emphasis on discrete-time survival data. The model is a finite mixture model where the subjects are allowed to move between components through time. The time-varying probability of component memberships is modeled as a function of subject-specific time-varying covariates. This allows for interesting within-subject dynamics and manageable computations even with a large number of subjects. Each parameter in the component

densities and in the mixing function is connected to its own set of covariates through a link function. The models are estimated using a Bayesian approach via a highly efficient Markov Chain Monte Carlo (MCMC) algorithm with tailored proposals and variable selection in all set of covariates. The focus of the paper is on models for discrete-time survival data with an application to bankruptcy prediction for Swedish firms, using both exponential and Weibull mixture components. The dynamic mixture-of-experts models are shown to have an interesting interpretation and to dramatically improve the out-of-sample predictive density forecasts compared to models with time-invariant mixture probabilities.

(continuing from previous year)

Modeling Dynamic Volatilities and Correlations under Skewness and Fat Tails
Xin Zhang, Drew Creal, Siem Jan Koopman, and André Lucas

We propose a new model for dynamic volatilities and correlations of skewed and heavy-tailed data. Our model endows a non-normal distribution with time-varying parameters driven by the information from the observation density function. The key novelty in our approach is the fact that the skewed and fat-tailed shape of the distribution directly affects the dynamic behavior of the time-varying parameters. We present simulated and empirical evidence that shows that the model outperforms its close competitors.

(continuing from previous year)

Speeding up MCMC by Efficient Data Subsampling
Matias Quiroz, Mattias Villani and Robert Kohn

The computing time for Markov Chain Monte Carlo (MCMC) algorithms can be prohibitively large for datasets with many observations, especially when the data density for each observation is costly to evaluate. We propose a framework based on a Pseudo-marginal MCMC where the likelihood function is unbiasedly estimated from a random subset of the data, resulting in substantially fewer density evaluations. The subsets are selected using efficient sampling schemes, such as Probability Proportional-to-Size (PPS) sampling where the inclusion probability of an observation is proportional to an approximation of its contribution to the likelihood function. We illustrate the method on a large dataset of Swedish firms containing half a million observations.

Generalized Autoregressive Score Model with Realized Measures of Volatility
Zhuo Huang, Tianyi Wang and Xin Zhang

We propose a new observation-driven dynamic parameter framework to model the financial return and realized variance jointly with a fat-tailed distribution. The latent true volatility is driven by the conditional density score, which is a weighted function of past daily return and realized variance. The new model mitigates the influence of extreme realizations, such that the volatility dynamics is robust to outliers in the observations. In the meanwhile, it adapts quickly to drastic volatility changes by incorporating realized measures of volatility based on high frequency data. Consequently the model provides a good in-sample and out-of-sample fit to both returns and realized variance. We apply the model to a number of stock market indices and demonstrate its promising performance, even during the recent financial crisis periods.

Score Driven Exponentially Weighted Moving Averages and Value-at-Risk Forecasting
André Lucas and Xin Zhang

We present a simple new methodology to allow for time variation in volatilities using a recursive updating scheme similar to the familiar RiskMetrics approach. We update parameters using the score of the forecasting distribution rather than squared lagged observations. This allows the parameter dynamics to adapt automatically to any non-normal data features and robustifies the subsequent volatility estimates. Our new approach nests several extensions to the exponentially weighted moving average (EWMA) scheme as proposed earlier. Our approach also easily handles extensions to dynamic higher-order moments or other choices of the preferred forecasting distribution. We apply our method to Value-at-Risk forecasting with Student's t distributions and a time varying degrees of freedom parameter and show that the new method is competitive to or better than earlier methods for volatility forecasting of individual stock returns and exchange rates.

Un-truncating VARs
Ferre De Graeve and Andreas Westermark

Macroeconomic research often relies on structural vector autoregressions to uncover empirical regularities. Critics argue the method goes awry due to lag truncation: short lag-lengths imply a poor approximation to DSGE-models. Empirically, short lag-length is deemed necessary as increased parameterization induces

excessive uncertainty. The paper shows that this argument is incomplete. Longer lag-length simultaneously reduces misspecification, which in turn reduces variance. For data generated by frontier DSGE-models long-lag VARs are feasible, reduce bias and variance, and have better coverage. Thus, contrary to conventional wisdom, the trivial solution to the critique actually works.

(continuing from previous year)

Static and Dynamic Binary Response Models with Misclassified Dependent Variables Applied to Annuity Ownership
Rob Alessie, Adriaan Kalwij and Peter van Santen

We study the problem of misclassification of the dependent variable in a binary choice setting. The literature has paid attention to the static (cross-sectional data) case, and finds that misclassification yields biased estimates of the parameters of interest. Much less is known about the dynamic (panel data) case. We derive the likelihood of the observed outcomes in a dynamic panel probit model, and discuss two approaches to parameter estimation. First, as proposed by Keane and Sauer (2009, Econometrica), one may resolve to simulating the entire process generating the data, and use simulated maximum likelihood to estimate the parameters. Second, we can formulate the problem as a hidden markov model. This setup allows us to use a recursive algorithm to compute the likelihood function without simulations. The expectation-maximization (EM) method can then be invoked for parameter estimation. We apply both static and dynamic models to ownership of annuity policies for a panel of Dutch households. The survey data is likely to be error-ridden, as we document transition probabilities in ownership at the household level which seem too large. Moreover, for a subset of households, we know the duration of the policies, and therefore can construct an ownership variable which should be closer to the true value. We use this measure to benchmark our results. Our estimates of the misclassification probabilities suggest that part of the "annuity puzzle" can be explained by underreporting ownership of annuities.

(continuing from previous year)

FINANCIAL THEORY

Financial Frictions, Investment and Tobin's q
Dan Cao, Guido Lorenzoni and Karl Walentin

We develop a model of investment with financial constraints and use it to investigate the relation between investment and Tobin's q. A firm is financed partly by insiders, who control its assets, and partly by outside investors. When their wealth is scarce, insiders earn a rate of return higher than the market rate of return, i.e., they receive a quasi-rent on invested capital. This rent is priced into the value of the firm, so Tobin's q is driven by two forces: changes in the value of invested capital, and changes in the value of the insiders' future rents per unit of capital. This weakens the correlation between q and investment, relative to the frictionless benchmark. We present a calibrated version of the model, which, due to this effect, generates a realistic joint behavior of investment, q, and cash flow. In particular, the model roughly replicates the values of the coefficients in empirical investment regressions.

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A Detrimental Feedback Loop: Deleveraging and Adverse Selection
Christoph Bertsch

Market distress can be the catalyst of a deleveraging wave, as in the 2007/08 financial crisis. This paper demonstrates how market distress and deleveraging can fuel each other in the presence of adverse selection problems in asset markets. At the core of the detrimental feedback loop is agents' desire to reduce their reliance on distressed asset markets by decreasing their leverage, which in turn amplifies the adverse selection problem in asset markets. In the extreme case, this leads to a market breakdown. I find that adverse selection creates both an "ex-ante" inefficiency because it distorts agents' long-term leverage choices, as well as an "interim" inefficiency because it distorts agents' short-term liquidity management. I derive important implications for central bank policy.

(continuing from previous year)

A Wake-up Call Theory of Contagion
Toni Ahnert and Christoph Bertsch

We propose a novel theory of financial contagion. We study global coordination games of regime change with an initially uncertain correlation of regional fundamentals. A crisis in one region is a wake-up call to investors in another region that induces a re-assessment of local fundamentals. Contagion after a wake-up

call can occur even if investors learn that fundamentals are uncorrelated and common lender effects or balance sheet linkages are absent. Applicable to currency attacks, bank runs, and debt crises, our theory of contagion is supported by existing evidence and generates new testable implications for empirical and experimental work.

(continuing from previous year)

Measuring Systemic Downside Risk Component of Asset Prices
Roméo Tédongap and Xin Zhang

We develop a representative agent consumption-based general equilibrium asset pricing model featuring generalized disappointment aversion preferences and multi-frequency long-run volatility risk. It allows for closed-form bond prices, stock prices and credit default swap spreads. We estimate the model parameters and state dynamics to match moments of the daily stock index return, the yield curve, and the daily term-structure of credit default swap spreads. We analytically decompose asset prices into two major components: a regular component and a systemic downside risk component. Our results point to a significant contribution of systemic risk to asset prices that is more important during crisis times.

(continuing from previous year)

The Development and Spread of Financial Innovations
Isaiah Hull

I study the process of financial innovation in a model with two classes of agents: ``sophisticated" and ``unsophisticated." Unsophisticated agents are hit with frictions that lower the return to a conventional asset they hold. Sophisticated agents construct financial innovations that are perfect substitutes for the conventional asset, but are not subject to the friction. In the absence of complete information, unsophisticated agents learn about innovations through a contagion process, as they encounter competitors who have already adopted them. The model yields two equilibria. In one, the innovation persists. In the other, it disappears. Only one equilibrium is stable, and this is determined by the strength of the contagion and by early strategic interactions between sophisticated agents. The model suggests mechanisms for several empirical regularities in the financial innovation literature. Additionally, two applications demonstrate how to estimate the contagion parameter with a short time series of volume data, and how to use it to predict whether a financial innovation will spread.

(continuing from previous year)

A Model of Costly Intermediation
Paola Boel and Gabriele Camera

We construct a microfounded model of money where banks reallocate idle cash by taking deposits and making loans. Banks are characterized by a labor-intensive technology that induces a real cost for financial intermediaries and therefore a spread between deposit and borrowing rates. Such spread responds to both monetary policy and the efficiency of financial intermediaries. We investigate how labor costs in the banking sector affect equilibrium interest rates, market prices and the welfare cost of inflation.

INTERACTION OF FISCAL AND MONETARY POLICY

Identifying Fiscal Inflation
Ferre De Graeve and Virginia Queijo von Heideken

Fiscal theorists warn about the risk of future inflation as a consequence of current fiscal imbalances in the US. Because actual inflation remains historically low and data on inflation expectations do not corroborate such risks, warnings for fiscal inflation are often ignored in policy and academic circles. This paper shows that a canonical NK-DSGE model enables identifying an anticipated component of inflation expectations that is closely related to fiscal policy. Estimation results suggest that fiscal inflation concerns have induced a 1.6%-points increase in long-run inflation since 2001. The model also rationalizes why data on inflation expectations do not reveal such concerns outright.

(continuing from previous year)

Fiscal Multipliers in a Nonlinear World
Jesper Lindé and Mathias Trabandt

Previous work has shown that, in a liquidity trap, aggressive government spending cuts can be self-defeating in the short-run due to a higher-than-normal multiplier. A potentially serious drawback of the

existing literature is the use of linearized models. Recently, Braun, Koerber and Waki (2012) and others claim that in a liquidity trap, a model can behave qualitatively different depending on whether it has been linearized or not. We examine their claim with a focus on whether fiscal austerity can be self-defeating - i.e. austerity causes government debt to rise due to adverse effects on aggregate demand. Specifically, we compare the government debt and output effects due to changes in fiscal spending in linearized and nonlinear general equilibrium models. We start with a variant of the simple benchmark model in Woodford (2003), which allows us to carefully parse out the differences between the linear and nonlinear solutions. Finally, we examine the robustness of our results in the workhorse model of Christiano, Eichenbaum and Evans (2005) augmented with a financial accelerator mechanism.

Fiscal Consolidations under Imperfect Credibility
Matthieu Lemoine and Jesper Lindé

This paper examines the effects of expenditure-based fiscal consolidation when credibility for the cuts to be long-lasting is imperfect. We contrast the impact limited credibility has when the consolidating country has the means to tailor monetary policy to its own needs, versus the case when it is a small member of a currency union with negligible impact on currency union interest rates and nominal exchange rates. We find two key results. First, under independent monetary policy, the adverse impact of limited credibility is relatively small, and consolidation can be expected to reduce government debt at a relatively low output cost given that monetary policy provides more accommodation that it would have to do under perfect credibility. Second, the lack of monetary accommodation under currency union membership implies that the output cost can be significantly larger, and that progress to reduce the government debt in the short- and medium-term is limited under imperfect credibility.

GROWTH

Fuel for Economic Growth
Johan Gars and Conny Olovsson

We set up an endogenous growth model where the efficiency of capital and fossil energy both can be improved, whereas the efficiency of an alternative energy sources is limited. With capital and energy being complements, sustainable growth is only possible if the stock of fossil energy in efficiency units is large enough. Otherwise, growth will come to a halt. Heterogeneity in initial TFP levels can generate the Great Divergence. The demand for fossil energy in technologically advanced countries drives up its price and make the fossil technology unprofitable in less advanced countries that choose the alternative and stagnant energy input

Energy-Saving Technical Change
John Hassler, Per Krusell and Conny Olovsson

We estimate an aggregate production function with constant elasticity of substitution between energy and a capital/labor composite using U.S. data. The implied measure of energy-saving technical change appears to respond strongly to the oil-price shocks in the 1970s and has a negative medium-run correlation with capital/labor-saving technical change. Our findings are suggestive of a model of directed technical change, with low short-run substitutability between energy and capital/labor but significant substitutability over longer periods through technical change. We construct such a model, calibrate it based on the historical data, and use it to discuss possibilities for the future. .

(continuing from previous year)

HOUSEHOLD SAVING

Household Indebtedness
Joao Cocco, Tor Jacobson, Thomas Jansson, and Paolo Sodini

In this project we have access to a new unique micro dataset, which includes detailed information not only on a large sample of Swedish households' financial and real assets but also on their liabilities. In the dataset the exact composition of households' asset portfolios and the conditions of their debt (amounts, interest rates, variable or fixed rates, collateral etc.) are reported. We also have detailed income data, which enables us to estimate labor income volatility (separated into transitory and permanent components) at the individual level. Hence, our dataset enables us to estimate a household's total exposure to various risk factors. In the first subproject we study mortgage debt defaults. Our preliminary empirical results indicate that households with high loan-to-value and loan-to-income ratios, high labor income risk, and low holdings of financial assets tend to default on their mortgage debt to a higher degree. The purpose of our

second subproject is to use micro data to calibrate a lifecycle model. Our focus will be on how households' housing and borrowing decisions are affected by the evolution of house prices, labor incomes and mortgage interest rates.

How Parents Influence the Wealth Accumulation of their Children
Peter Englund, Thomas Jansson and Todd Sinai

We decompose the channels through which parents and children have correlated net worth using a novel administrative data set from Sweden that follows a panel of parents matched to their grown children. We find that children's initial endowments of net worth and their subsequent net worth accumulations are positively correlated with parents' net worth. There are two main channels of intergenerational wealth correlation. Children of wealthy parents have higher earnings, even conditional on intergenerational correlation in earnings, most of which they consume. The intergenerational correlation in net worth comes largely from housing wealth. We argue that arises from correlated home ownership among high net worth parents and their children, the propensity of home owners to save, and from children of high net worth parents spending more on housing at the time of first purchase. We also consider the impact of bequests, intervivos transfers, portfolio choice, and savings propensities.

(continuing from previous year)

Incompatible European Partners? Cultural Predispositions and Household Financial Behavior
Michael Haliassos, Thomas Jansson and Yigitcan Karabulut

The Eurozone fiscal crisis has created pressure for institutional harmonization, but skeptics argue that cultural predispositions can prevent convergence in behavior. Our paper derives a robust cultural classification of European countries and utilizes unique data on natives and immigrants to Sweden. Classification based on genetic distance or on Hofstede's cultural dimensions fails to identify a single 'southern' culture but points to a 'northern' culture. Significant differences in financial behavior are found across cultural groups, controlling for household characteristics. Financial behavior tends to converge with longer exposure to common institutions, but is slowed down by longer exposure to original institutions.

(continuing from previous year)

Uncertain Pension Income and Household Saving
Peter van Santen

I study the relationship between household saving and pensions, and estimate both the displacement effect of pensions on private saving and the precautionary saving effect due to uncertainty in pension income. Using a lifecycle framework, current consumption is derived as a function of expected pension benefits, pension risk and mortality risk. I estimate the saving rate equation implied by the model using panel data for Dutch households. Pension benefits and survival expectations are elicited probabilistically. Regression results show that more affluent households displace saving with expected pension income, and that households save more due to pension income uncertainty and to lifetime uncertainty, as predicted by the theory. These results are robust to the inclusion of correlated random household effects.

(continuing from previous year)

LABOR MARKETS

The Optimal Inflation Target under Downward Nominal Wage Rigidity
Mikael Carlsson and Andreas Westermark

We study the implications for optimal average inflation when there is both a role for money as a medium of exchange and when nominal wages are downwardly rigid. The model also features transaction costs, as in Dotsey, King & Wolman (1999), and a non-Walrasian labor market with search frictions as in Trigari (2009). The introduction of downward nominal wage rigidities into a model with flexible wages can be decomposed into two effects; first, introducing (symmetric) wage adjustment frictions and, second making them asymmetric. Productivity growth is important for the level of inflation and also affects the size of the effect of the asymmetric wage friction. Without productivity growth, symmetric wage adjustment frictions leads to a yearly inflation rate of approximately 1.0%, while introducing an asymmetry on top of this increases the inflation rate by an additional 0.7%. With productivity growth, inflation is almost a percent lower and the effect of adding asymmetric wage frictions is also somewhat smaller - about 0.5%. Overall, we find an optimal inflation rate of about 0-2 percent.

(continuing from previous year)

Labor Market Frictions and Optimal Steady-State Inflation
Mikael Carlsson and Andreas Westermark

In central theories of monetary non-neutrality, the Ramsey optimal steady-state inflation rate varies between the negative of the real interest rate and zero. This paper explores how the interaction of nominal wage and search and matching frictions affect the policy prescription. We show that adding the combination of such frictions to the canonical monetary model can generate an optimal inflation rate that is significantly positive. Specifically, for a standard U.S. calibration, we find a Ramsey optimal inflation rate of 1.15 percent per year.

(continuing from previous year)

Labor Market Frictions, the Long-Run Phillips curve and Optimal Monetary Policy
Mikael Carlsson and Andreas Westermark

The paper analyzes the Long- and Short-run Phillips curves in a model akin to the previous project. Specifically, we find a negative long-run relationship between inflation and unemployment. Moreover, we also analyze equilibrium dynamics under optimal monetary policy.

(continuing from previous year)

The Replacement Rate, Unemployment and Wage Setting
Vesna Corbo and Andreas Westermark

The project aims at empirically evaluating the effect of changes in the replacement rate on wage setting behavior and unemployment in a standard DSGE model incorporating firm-specific labor and bargaining between the firm and the workers with staggered wage and price contracts. Moreover, the relationship between the replacement rate and wage setting and unemployment will also be studied using reduced form IV methods that is standard in the literature to investigate whether general equilibrium DSGE models performs better than reduced form methods.

(continuing from previous year)

Fiscal Multipliers under Downward Nominal Wage Rigidity
Mikael Carlsson and Andreas Westermark

The purpose of this paper is to analyze whether fiscal multipliers are asymmetric in the presence of downward nominal wage rigidities. Specifically, spending shocks might have smaller effects on wages in recessions than in booms, implying that multipliers vary across the cycle.

(continuing from previous year)

Spillover Effects from Labor Mobility
Mikael Carlsson, Lena Hensvik, Oskar Nordstrom-Skans and Peter van Santen

We analyze labor flows between Swedish manufacturing firms, using a matched employer-employee data set covering Sweden between 1990 and 2002. We find that workers moving from more-productive firms to less-productive firms are associated with productivity gains for the receiving firms. In contrast, hiring from less-productive firms is neutral to productivity. The gains are especially large for engineers. The results are robust to a number of control variables, including firm fixed effects. The next step is to apply this method to the dataset covering the universe of firms and workers between 1990 and 2011.

(continuing from previous year)

The Aggregate Significance of Labor Reallocation
Susanto Basu, Mikael Carlsson and Peter van Santen

We analyze the impact of workers switching between firms on aggregate productivity growth. The GDP decomposition in Basu and Fernald (2002, European Economic Review) identifies the contributions of firm-level productivity growth, worker and capital flows and technological change on aggregate productivity growth and subsequently GDP. This paper quantifies the importance of worker reallocation on aggregate productivity growth. In a nutshell, worker flows boost GDP if high-productivity firms expand and low-productivity firms shrink. Our data spans the population of workers and firms in Sweden between 1997 and 2011, and allows us to match workers to firms. Separating out the firm-specific component of wages and under the assumption of cost minimization, we show that there is no systematic flow of workers towards high-productivity firms, resulting in a near-zero contribution of worker reallocation to aggregate productivity growth. This holds for both the aggregate economy, as well as for virtually all sectors of the economy in isolation. This result is in contrast with previous studies of the manufacturing sector, where

between-firm reallocation is an important component of aggregate growth. Quantifying the methods used in previous studies shows that Sweden is no different when looking at market share reallocation, yet that whatever is causing between-firm growth is not due to labor flows. The lack of direction in labor flows is robust to various specifications of the marginal product of labor.

MACROECONOMICS

Expectation Driven Business Cycles with Limited Enforcement
Karl Walentin

We explore the implications of shocks to expected future productivity. In a setting with limited enforcement of financial contracts, firms have to post collateral to obtain external finance. In a real one-sector model with this type of "collateral constraint", positive news about future productivity implies an increase in stock prices and available credit that yield a general economic expansion, i.e. an expectation-driven business cycle. Furthermore, in an open economy setting these properties are obtained with standard consumption preferences and capital adjustment costs.

(accepted for publication)

Welfare Costs of Energy Markups with Pollution Externalities
Christos Makridis and Conny Olovsson

We investigate the effect of market power among energy producers on the volatility of energy prices and pollution. First, we document the pro-cyclical nature of markups in the energy sector. Second, we develop a dynamic stochastic general equilibrium model with monopolistically competitive energy producers and auto-correlated shocks to both capital and energy productivity in order to understand the extent to which markups explain the observed volatility in energy prices and to implement a series of computational experiments. Calibrating the model and disciplining it to our estimated data on energy firms' markups, we derive the optimal policy for managing both pollution externalities and market power. We show that only addressing one of these externalities at the expense of another can impose large welfare costs.

Job Displacement and the Cost of Business Cycles
Karl Walentin and Andreas Westermark

A major question in macroeconomics is whether welfare costs of business cycles are substantial or not. Also, unemployment is often mentioned as an important cause of welfare losses. We show that cyclical variation in unemployment rate reduces the aggregate level of output and welfare. The mechanism we have in mind concerns the earnings losses generated by job displacement (mass lay-offs). It has been broadly established that this type of earnings losses are large. We rely on the results of Davis and von Wachter (BPEA, 2011) who document that the frequency of job displacement is countercyclical and that present discounted earnings losses are increasing in the unemployment rate. Together, the two facts imply that displacement occurs at a higher frequency in times when it is more costly. An economy with the same average displacement rate but without any unemployment volatility would yield lower earnings losses due to displacement. We model the mechanism above in a general equilibrium framework with a search and matching labor market. The two key facts we capture in our model are i) the countercyclicality of job displacement and ii) that long-term earnings losses are substantially higher for workers who are displaced in recessions rather than in booms. The first fact is straightforward to obtain with endogenous separations. The second follows from the combination of human capital loss in unemployment and longer unemployment spells in recessions.

Refining Stylized Facts from Factor Models of Inflation
Ferre de Graeve and Karl Walentin

Factor models of disaggregate inflation indices suggest that sectoral shocks generate the bulk of sectoral inflation variance, but no persistence. Aggregate shocks, by contrast, are the root of sectoral inflation persistence, but have negligible relative variance. We show that simple factor models do not cope well with essential features of price data. In particular, sectoral inflation series are subject to features such as measurement error, sales and item substitutions. In factor models, these blow up the variance of sector-specific shocks, while reducing their persistence. We control for such effects by estimating a refined factor model and find that inflation variance is driven by both aggregate and sectoral shocks. Sectoral shocks, too, generate substantial inflation persistence. Both findings contrast with earlier evidence from factor models, but align well with recent micro evidence. Our results have implications for the foundations of price stickiness, and provide quantitative inputs for calibrating models with sectoral heterogeneity.

(accepted for publication)

The Macro-Financial Implications of House Price-Indexed Mortgage Contracts
Isaiah Hull

A standard, no-recourse mortgage contract does not adjust when the value of the underlying collateral falls. Consequently, shocks that lower house prices may trigger one of the necessary conditions for default: negative equity. A common alternative contract attempts to prevent default by imposing full-recourse. This may cause individuals who believe they are likely to default to rent; however, it does not prevent those who buy from experiencing negative equity. I consider a contract that instead precludes negative equity by tying outstanding debt to an index of house prices. This is done in an incomplete markets model that is calibrated to match U.S. micro and macro data. I find that switching to the house-price indexed contract reduces the default rate from .72% to .11% and expands homeownership rates among the young and the poor, but pushes up the equilibrium minimum mortgage rate by 90 basis points. The volatility of net cashflows to financial intermediaries also increases slightly under the new contract.

Optimal Taxation with Home Production
Conny Olovsson

Optimal taxes for Europe and the U.S. are derived in a realistically calibrated model in which agents buy consumption goods and services and use home capital and labor to produce household services. The optimal tax rate on services is substantially lower than the tax rate on goods. Specifically, the planner cannot tax home production directly and instead lowers the tax rate on market services to increase the relative price of home production. The optimal tax rate on the return to home capital is strictly positive and the welfare gains from switching to optimal taxes are large.

(accepted for publication)

MONETARY POLICY AND THEORY

Business-Cycle Implications and Mortgage Spreads
Karl Walentin

How do aggregate quantities at the business cycle frequency respond to shocks to the spread between residential mortgage rates and government bonds? Using a structural VAR approach, we find that mortgage spread shocks impact the real economy by both economically and statistically significant magnitudes: a 100 basis point decline in the spread causes a peak increase in consumption, residential investment and GDP by 1.6 percent, 6.2 percent and 1.9 percent, respectively. Presumably, these effects are magnified when the policy rate is held fixed, as was the case in the US during the recent implementation of unconventional monetary policy.

(accepted for publication)

A Note on Nominal GDP Targeting and the Zero Lower Bound
Roberto Billi

I compare nominal GDP level targeting to strict price level targeting in a small New Keynesian model, with the central bank operating under discretion and facing a zero lower bound on nominal interest rates. Strict price level targeting performs better in terms of welfare, implies a lower optimal rate of inflation, and is more robust to an increase in the risk of hitting the zero lower bound.

(continuing from previous year)

Output Gaps and Robust Monetary Policy Rules
Roberto Billi

Policymakers often use the output gap, a noisy signal of economic activity, as a guide for setting monetary policy. Noise in the data argues for policy caution. At the same time, the zero bound on nominal interest rates constrains the central bank's ability to stimulate the economy during downturns. In such an environment, greater policy stimulus may be needed to stabilize the economy. Thus, noisy data and the zero bound present policymakers with a dilemma in deciding the appropriate stance for monetary policy. I investigate this dilemma in a small New Keynesian model, and show that policymakers should pay more attention to output gaps than suggested by previous research.

(continuing from previous year)

Forward Guidance and Long Term Interest Rates: Inspecting the Mechanism
Ferre De Graeve, Pelin Ilbas and Raf Wouters

Forward guidance policies are often argued to stimulate economic activity by reducing nominal long term interest rates. We document why a lower nominal long rate is neither necessary nor sufficient for forward guidance to be successful. We determine the mechanisms behind widely varying long rate responses in existing empirical structural models. Imperfect information about the rationale for forward guidance can severely distort long rate effects and attenuate much of its expansive effect. These results suggest caution in interpreting event-studies of forward guidance.

Tax Benefits of Debt Financing and the Optimal Rate of Inflation
Daria Finocchiaro, Giovanni Lombardi, Caterina Mendicino and Philippe Weil

This paper investigates the welfare properties of long-run inflation in the presence of corporate taxes and borrowing constraints. On the one hand, since nominal interest expenses are deductible, changes in the expected rate of inflation influence the effective real rate faced by firms and the tightness of their financial conditions. On the other hand, because of accounting capital depreciation rules, inflation increases firms' taxable profits. We show that in the presence of a collateralized debt, the first effect dominates and that a significantly positive rate of long-run inflation is welfare improving through the mitigation of the financial distortion and the resulting stimulus to capital accumulation.

Seigniorage, Gesell Taxes and Monetary Policy in the Middle Ages
Roger Svensson and Andreas Westermark

A common form of government revenue during the Middle Ages was Gesell taxation. Gesell taxes were implemented through money being legal tender only for a limited time period and, at the end of that period, current money had to be exchanged for newly issued money for a fee - called periodic re-coinage by archeologists. Empirical evidence based on several methods shows that periodic re-coinage: 1) could occur as often as twice a year within a currency area; and 2) was the dominating method used to generate seigniorage during 150-200 years in large parts of medieval Europe. We set up a cash-in-advance model to analyze the consequences of periodic re-coinage on prices, re-minting and people's choice to use new or old coins for transactions. It turns out that prices temporarily rise up to the re-coinage date and then drops just after this date and then start rising again. People prefer to re-mint their old coins for new ones: 1) the lower is the exchange fee; 2) the longer is the time period between re-coinage; and 3) the higher is the probability to be detected for using old coins.

Designing a Simple Loss Function for the Fed: Does the Dual Mandate Make Sense?
Davide Debortoli, Jinill Kim, Jesper Lindé and Ricardo Nunes

Yes, the dual mandate makes a lot of sense. Using the Smets and Wouters (2007) model of the U.S. economy, we find that the role of the output gap should be equal to or even more important than that of inflation when designing a simple loss function to represent household welfare. We also document that a loss function with nominal wage inflation and the hours' gap provides an even better approximation of the true welfare function than a standard objective based on inflation and the output gap. Our results hold up when we introduce interest rate smoothing in the objective to capture the observed gradualism in policy behavior and ensure that the probability of the federal funds rate hitting the zero lower bound is negligible.

Optimal Monetary Policy with Heterogeneous Agents
Paola Boel and Christopher J. Waller

We construct a dynamic stochastic general equilibrium model with consumption risk, stochastic time preferences and aggregate shocks. Money is essential for trade and prices are fully flexible. We prove that in this economy the Friedman rule cannot sustain the constrained-efficient allocation, but the nature of the inefficiency depends on the specification of labor disutility considered. Indeed, with convex disutilities, patient agents are unconstrained but have an incentive to oversave due to a pricing externality induced by impatient agents. This effect disappears with a linear disutility, but impatient agents remain constrained. We therefore investigate optimal short-run output stabilization policies implemented by the monetary authority at zero interest rates. We find the optimal policy consists in maintaining a price-level target and smoothing consumption across states via state-contingent money injections that are unraveled at a later time, thus leaving the real value of money unchanged.

On the Redistributive Effects of Inflation: an International Perspective
Paola Boel

I use a microfounded model of money to quantify the redistributive effects of expected inflation in a sample of OECD countries. In doing so, I address two quantitative issues. First, I pin down money demand rigorously, which implies accounting for the possibility of policy breaks. I show that this has significant implications for both the quality of the fit as well as the measurements' values. Second, I construct comparable estimates of wealth distribution across countries by using harmonized microdata from the Luxembourg Wealth Study. Two main results emerge from the analysis. First, in all countries considered inflation acts as a regressive tax. Second, the magnitude of such redistributive effects differs across countries and it depends not only on wealth distribution, but also on the curvature and the level of money demand.

(continuing from previous year)

Redistributive Effects of Inflation in a Model of Money and Capital
Paola Boel and Julián P. Díaz

We introduce heterogeneity in trade risk in a microfounded model of money with capital, thus inducing a distribution in both cash and capital holdings. We then calibrate the model for a subsample of OECD countries. In doing so, we address the following questions: What are the redistributive effects of inflation? How does the nature of the asset held affect the direction of the redistribution? Does inflation act as a progressive tax when a productive asset is held? Do results hold across OECD countries? Several results hold for all countries considered. First, inflation acts as a tax on two fronts, in that it reduces both real cash balances and capital accumulation. Second, inflation is a progressive tax which hurts rich, high-consumption agents more than it does poor, low-consumption ones. Third, the magnitude of the redistributive effects differs across countries and depends on the distributions of capital and liquid asset holdings.

(continuing from previous year)

Money, Credit and the Redistributive Effects of Inflation
Paola Boel and Daria Finocchiaro

We construct a microfounded model of money with heterogeneity in discounting and trading risk. Agents can insure against this risk with money and have also access to financial markets that issue via inter-period contracts. A form of limited participation in financial markets leads to both coexistence of money and credit in the economy and heterogeneity in money and debt holdings. The model is then utilized to quantitatively assess the effects of debt on the redistributive effects of inflation.

OPEN ECONOMY MACROECONOMICS

Jump-Starting the Euro Area Recovery: Should the Core Expand Spending to Help the Periphery?
Olivier Blanchard, Christopher Erceg and Jesper Lindé

Would a fiscal expansion in Europe's core economies boost periphery GDP? The answer depends on a number of factors. Periphery GDP is more likely to expand if monetary policy is unlikely to raise interest rates for a prolonged period, if core government spending has substantial import content, and if inflation is quite responsive to resource slack. Even so, the welfare benefits of a core fiscal expansion depend not only on how higher spending affects output and inflation in each economy, but on their relative business cycle positions.

Monetary Policy Trade-Offs in an Estimated Open-Economy DSGE Model
Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E.O. Svensson

This paper studies the trade-offs between stabilizing CPI inflation and alternative measures of the output gap in Ramses, the Riksbank's estimated dynamic stochastic general equilibrium (DSGE) model of a small open economy. Our main finding is that the trade-off between stabilizing CPI inflation and the output gap strongly depends on which concept of potential output in the output gap between output and potential output is used in the loss function. If potential output is defined as a smooth trend this trade-off is much more pronounced compared to the case when potential output is defined as the output level that would prevail if prices and wages were flexible.

(accepted for publication)

Publications accepted in 2014

Adolfson, Malin, Stefan Laséen, Jesper Lindé and Lars E.O. Svensson, "Monetary Policy Trade-Offs in an Estimated Open-Economy DSGE Model", *Journal of Economic Dynamics and Control*, forthcoming

Bertsch, Christoph, Claudio Calcagno and Mark Le Quement, "Systematic Bailout Guarantees and Tacit Coordination", *B.E. Journal of Economic Analysis and Policy (Advances),* forthcoming

Billi, Roberto M., Comment on "Monetary Policy and Exchange Rate Stabilization in Norway and Sweden", by Hilde Bjørnland and Junior Maih, forthcoming in *Reform Capacity and Macroeconomic Performance in the Nordic Countries*, ed. Torben M. Andersen, Michael Bergman, and Svend E. Hougaard Jensen, Oxford University Press

Carlsson, Mikael, Julián Messina and Oskar Nordström-Skans, "Wage Adjustment and Productivity Shocks, *Economic Journal*, forthcoming

Cerqueiro, Geraldo, Steven Ongena and Kasper Roszbach, "Collateralization, Bank Loan Rates and Monitoring", *Journal of Finance*, forthcoming

De Graeve, Ferre and Karl Walentin, "Refining Stylized Facts from Factor Models of Inflation", *Journal of Applied Econometrics*, forthcoming

McCarthy, Kilian, Peter van Santen and Ingo Fiedler, " Modeling the Money Launderer: Microtheoretical Arguments on Anti-Money Laundering Policy", *International Review of Law and Economics*, forthcoming

Olovsson, Conny, "Optimal taxation with home production" *Journal of Monetary Economics*, forthcoming

Walentin, Karl, "Expectation Driven Business Cycles with Limited Enforcement", 2014, *Economics Letters*, Vol. 124, pp 300-303.

Walentin, Karl, "Business Cycle Implications of Mortgage Spreads", 2014, *Journal of Monetary Economics*, Vol. 67, pp 62-77

Working papers

No. 293, Mikael Carlsson, Julián Messina and Oskar Nordström Skans, "Firm-Level Shocks and Labor Adjustments"

No. 292, Ferre De Graeve, Pelin Ilbas and Raf Wouters, "Forward Guidance and Long Term Interest Rates: Inspecting the Mechanism"

No. 291, Vesna Corbo, "Dynamic Demand Adjustment and Exchange Rate Volatility"

No. 290, Mikael Carlsson, "Selection Effects in Producer-Price Setting"

No. 289, Christoph Bertsch, Claudio Calcagno and Mark Le Quement, "Systematic Bailout Guarantees and Tacit Coordination"

No. 288, Patrick J. Dennis and Patrik Sandås, "Does Trading Anonymously Enhance Liquidity?"

No. 287, Isaiah Hull, "The Macro-Financial Implications of House Price-Indexed Mortgage Contracts"

No. 286, Antje Berndt, Burton Hollifield and Patrik Sandås, "How Subprime Borrowers and Mortgage Brokers Shared the Pie"

No. 285, Michael Haliassos, Thomas Jansson and Yigitcan Karabulut, "Incompatible European Partners? Cultural Predispositions and Household Financial Behavior"

No. 284, Conny Olovsson, "Optimal Taxation with Home Production"

Other research activities

Conferences

The Research Division, in collaboration with the Euro Area Business Cycle Network, organized a conference on "Inequality and Macroeconomics." The conference brought together leading experts in the field that discussed the following topics: recent developments in heterogeneous-agent modeling, the empirics of heterogeneity, effects of monetary and fiscal policies in heterogeneous-agent economies, macroeconomic drivers of inequality, and more. The organizing committee consisted of Klaus Adam (University of Mannheim), Paola Boel (Riksbank), Daria Finocchiaro (Riksbank), Tor Jacobson (Riksbank), Per Krusell (IIES, Stockholm University) and Tony Smith (Yale University).

Courses

The Research Division organized three courses in 2014. The first two were open to Riksbank's employees as well as economics Ph.D. students from the Stockholm area and took place in the spring of 2014. The first course was taught by Professor Randall Wright from the University of Wisconsin-Madison. The lectures covered the following topics in monetary theory: early microfounded models of money; the mechanism-design approach; quantitative papers using numerical methods; search models that can be used for quantitative and policy work and papers on the welfare effects of inflation.

The second course was taught by Professors Lars E.O. Svensson from SIFR, Nils Gottfries from Uppsala University and Johan Söderberg from Stockholm University. It was a second-year Ph.D. course on monetary economics aimed at introducing students to modern New Keynesian models for monetary policy and business-cycle analysis.

The third course took place in December 2014 and was organized in collaboration with the Euro Area Business Cycle Network. The topic was "Macroeconomics and Inequality" and lectures were held by Professors Per Krusell from IIES at Stockholm University and Tony Smith from Yale University.

Greater Stockholm Macro Group

Together with Per Krusell (IIES, Stockholm University), we continue to organize a monthly internal seminar series for macro researchers from all major institutions in Stockholm and Uppsala. The series is known as "Greater Stockholm Macro Group" and aims at fostering exchange of ideas and cooperation among macro researchers in the Stockholm area.

Research Seminars

The Research Division organizes weekly research seminars, mainly by invited international visitors. The seminars normally take place on Tuesdays at 1 pm and attendance is open to Riksbank employees as well as to all academics. A complete list of both upcoming and past seminars is available on the homepage of the Riksbank's Research Division.

Internship Program

As customary, the Research Division hosted four PhD interns in 2014. This year's interns were Niklas Amberg (Stockholm School of Economics), Anjeza Kadilli (University of Geneva), Sevim Kosem (London School of Economics) and Hannes Malmberg (IIES, Stockholm University).

Sabbaticals

Ferre de Graeve visited University College London in the spring. Thomas Jansson visited the Federal Reserve Bank of Philadelphia and the Wharton School at the University of Pennsylvania in the fall.

Teaching and Advising

Daria Finocchiaro taught half of the first-year graduate macro course at Uppsala University in the fall. Her lectures dealt with classical consumption theory, asset prices and overlapping generation models, while also touching upon fiscal policy issues. Conny Olovsson taught a master's course on ''The Climate and the Economy'' at Stockholm University. Karl Walentin advised an economics Ph.D. student from Uppsala University, while Paola Boel advised an economics MSc student, also from Uppsala University.

Miscellanea

Christoph Bertsch was in the program committee for the Annual Meeting of IBEFA at ASSA 2015. Paola Boel was in the program committee for the Federal Reserve Bank of Atlanta/CEP Workshop on Monetary Policy and Inequality.

Upcoming events in 2015

The Research Division is planning a conference on deflation in June 2015. The conference will focus on the causes and economic consequences of deflation, as well as on the policies that can mitigate such consequences. The organizing committee consists of Jesper Lindé, Karl Walentin and Andreas Westermark, all from the Riksbank.

   The division is also organizing a second-year PhD course on monetary economics. The course will be held at the bank, and will be taught by faculty from Stockholm University and Riksbank's researchers. The purpose of the course is to introduce students to modern New Keynesian models for monetary policy and business cycle-analysis.

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